

WHAT IS CLAIMED IS:

1. A cooling system for a motor comprising a driving motor, a power converter for controlling said driving motor, and cooling means for forced  
5 cooling said driving motor and said power converter, wherein:  
said cooling means has refrigerant feeding means, motor temperature detection means for detecting the temperature of said driving motor and outputting a motor temperature detection signal, power converter temperature detection means for detecting the temperature of  
10 said power converter and outputting it as a power converter temperature detection signal, and forcible cooling control means for referring to said motor temperature detection signal and said power converter temperature detection signal and controlling said refrigerant feeding means and  
said forcible cooling control means has motor forcible cooling control  
15 temperature storage means for storing said motor forcible cooling control temperature for starting or stopping forcible cooling for said driving motor, power converter operation start temperature storage means for storing the temperature of said power converter at the time of operation start as a power converter operation start temperature, and power converter forcible  
20 cooling control temperature rise amount storage means for setting and storing said temperatures for starting and stopping forcible cooling for said power converter as a forcible cooling control temperature rise amount by the temperature rise amount from said power converter operation start temperature and  
25 refers to said power temperature detection signal and said power

converter temperature detection signal and when said motor temperature  
detection signal rises up to said motor forcible cooling control temperature  
or the temperature rise amount of said power converter temperature  
detection signal from said power converter operation start temperature  
5 reaches the rise amount of said forcible cooling control temperature, starts  
control of the operation of said refrigerant feeding means.

2. A cooling system for a motor according to Claim 1, wherein :  
said rise amount of forcible cooling control temperature includes  
10 said forcible cooling start temperature and said forcible cooling stop  
temperature and the difference between said forcible cooling start  
temperature and said forcible cooling stop temperature is fixed.

3. A cooling system for a motor according to Claim 1, wherein :  
15 said forcible cooling control means changes said rise amount of  
forcible cooling control temperature according to said power converter  
operation start temperature.

4. A cooling system for a motor according to Claim 3, wherein:  
20 said rise amount of forcible cooling control temperature according to  
said power converter operation start temperature decreases as said  
power converter operation start temperature rises.

5. A cooling system for a motor according to Claim 4, wherein:  
25 said forcible cooling start temperature and said forcible cooling stop

temperature in said rise amount of forcible cooling control temperature decreasing as said power converter operation start temperature rises reduce the change amount of said forcible cooling stop temperature for said forcible cooling start temperature.

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6. A cooling system for a motor according to one of Claims 1 to 5, wherein:

said forcible cooling control means obtains a temperature rise amount from said power converter operation start temperature when the operation is restarted within a short stop period after ending of said operation as a temperature rise from said power converter operation start temperature at the time of preceding operation start.

7. A cooling system for a motor according to one of Claims 1 to 6, wherein:

said refrigerant feeding means has a refrigerant circulation system for circulating a liquid refrigerant by connecting said driving motor, said power converter, a radiator with a motor fan, and a pump in series and

said forcible cooling control means has fresh air temperature detection means for detecting fresh air temperature and outputting a fresh air temperature detection signal and controls said motor fan according to the temperature difference between said fresh air and said liquid refrigerant.

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8. A cooling system for a motor according to one of Claims 1 to 7,  
wherein:

5 said forcible cooling control means, when said fresh air temperature  
or said liquid refrigerant temperature at the time of operation start of said  
motor is not higher than the solidifying temperature of said liquid  
refrigerant, sets said power converter operation start temperature to said  
solidifying temperature of said liquid refrigerant.

10 9. A cooling system for a motor according to one of Claims 1 to 8,  
wherein:

said power converter, when the temperature of said driving motor or  
said power converter approaches the heat resistance allowable  
temperature, reduces the conversion output power.

15 10. A cooling system for a motor according to one of Claims 1 to 9,  
wherein:

said power converter temperature detection means is built in a chip  
of semiconductor switching element constituting said power converter.

20 11. A cooling system for a motor comprising a driving motor, a power  
converter for controlling said driving motor, and cooling means for forced  
cooling said driving motor and said power converter, wherein:

25 said cooling means has refrigerant feeding means, motor  
temperature detection means for detecting the temperature of said driving  
motor and outputting a motor temperature detection signal, power

converter temperature detection means for detecting the temperature of  
said power converter and outputting it as a power converter temperature  
detection signal, and forcible cooling control means for referring to said  
motor temperature detection signal and said power converter temperature  
5 detection signal and controlling said refrigerant feeding means and  
said forcible cooling control means has fresh air temperature  
detection means for detecting the fresh air temperature and outputting a  
fresh air temperature detection signal, refers to said motor temperature  
detection signal, said power converter temperature detection signal, and  
10 said fresh air temperature detection signal, thereby controls said  
refrigerant feeding means.

12. A cooling control method for a motor comprising a driving motor, a  
power converter for controlling said driving motor, and cooling means for  
15 forced cooling said driving motor and said power converter, wherein:  
said cooling means has refrigerant feeding means, motor  
temperature detection means for detecting the temperature of said driving  
motor and outputting a motor temperature detection signal, power  
converter temperature detection means for detecting the temperature of  
20 said power converter and outputting it as a power converter temperature  
detection signal, and forcible cooling control means for referring to said  
motor temperature detection signal and said power converter temperature  
detection signal and controlling said refrigerant feeding means and  
said forcible cooling control means stores said motor forcible cooling  
25 control temperatures for starting and stopping forcible cooling for said

driving motor, the temperature of said power converter at the time of  
operation start as a power converter operation start temperature, and said  
forcible cooling control temperature rise amount set by said temperature  
rise amount from said power converter operation start temperature as a  
5 temperature for starting or stopping forcible cooling for said power  
converter and

refers to said power temperature detection signal and said power  
converter temperature detection signal and when said motor temperature  
detection signal rises up to said motor forcible cooling control temperature  
10 or said temperature rise amount of said power converter temperature  
detection signal from said power converter operation start temperature  
reaches said rise amount of forcible cooling control temperature, starts  
control of the operation of said refrigerant feeding means.